Wisconsin Highway Research Program
FFY 2008 Request for Proposal: Data Integration Technical Oversight Committee
Development of a Database Framework and Implementation Plan for Integrating WisDOT Materials and Construction Databases

Background

There is a great need from both the agency and researcher perspective to make pavement materials and construction data more accessible. Many research projects involve examining relationships between material properties measured in the laboratory and field performance. In the past such projects have faced significant time delays due to difficulties encountered by both the researcher and WisDOT personnel in gathering adequate materials, construction, and performance data. These delays are a detriment to both parties, forcing the researcher to spread out the same amount of money over an extended period of time and delaying application of the research to practice for the agency. Furthermore, as the department moves towards the implementation of MEPDG for pavement design, much more detailed data will be needed in terms of materials for design inputs, and construction and performance data for future calibration efforts. Enhanced organization and access to this data is a critical component to proper application and analysis of this new pavement design procedure.

Currently pavement performance, materials, and construction data are all housed in separate, independent databases. The databases are loosely connected through geographic location or project ID number and are maintained independently by different WisDOT personnel in the Technical Services and Project Development Sections. The following is a list of the databases currently in use and information in them (this list is not comprehensive):

- Pavement Information File: Pavement Performance
- DTD View: Project data (i.e. design traffic data, as-built plans)
- Materials Tracking System: QC/QA records for projects
- Pavement Design Reports
- HMA Mix Design Database

Mining of all these databases for pertinent information for specific projects involves identification of common links and physical manipulation of the data to obtain the desired information. This process is very time consuming and inefficient. Improvement of the system would be of great benefit to both researchers and WisDOT.

Research Objectives

The overall objective of this research is to recommend a common referencing system for use in the development of a database framework for integrating current WisDOT pavement management, construction, and materials databases. This effort will improve the quality of data obtained from these databases and enhance the efficiency of data gathering efforts. The overall research objective will be met through the following tasks:

1. Contact and interview researchers with previous experience analyzing WisDOT Databases and analyze their lessons learned.
2. Perform a survey of relevant spatial (WISLR, STH Database, etc), performance (PIF), and materials databases (MTS, HMA Mix Design Log, etc) to identify their current custodians, structures, contents, and intended applications. Work with WisDOT representatives to refine list of databases to be analyzed and linked.
3. Identify and map the current state and the future state of logical relationships in these databases.
4. Identify institutional and technical constraints and dependencies.
5. Suggest revisions to current databases and evaluate methods for connecting the databases in use.
6. Provide an economic analysis, with logistical requirements, associated with implementing any final recommendations. Results of this analysis should be used as a means for prioritizing recommended design alternatives.
7. Provide a recommended solution and an implementation plan that best address the data needs and requirements. The solution should be communicated in a technical design document that outlines the functional and non-functional requirements, constraints, and design of the recommended database structure and framework. The implementation plan must include interaction with WisDOT to define how the institutional constraints and dependencies in Task 4 will be addressed.

Deliverables

The following deliverables at a minimum are required for the completion of this project:

- Final report
- Design document as specified in Task 7.

Benefits

The results of this research will provide WisDOT with recommendations for integrating their current databases and estimate the economic and logistical requirements associated with developing this new database structure. The use of a GIS based or other common referencing system to link current pavement performance, materials, and construction databases will ultimately lead to more comprehensive data sets for projects and reduced time invested in data gathering.

Expected Cost and Duration

It is anticipated that this research will be completed in 18 months for a cost not to exceed $80,000. Time and cost estimates supplied in the research proposals will be evaluated by the TOC as part of the selection criteria. The TOC requires that a draft final report be submitted 3 months prior to the contract completion date to ensure adequate time for revision and review.